

# Aerobraking Magellan: Plan versus Reality

by

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The orbit of the Magellan spacecraft was circularized by aerobraking during a 70 day phase that began on May 25, 1993 (late in the extended mission). This paper will compare the actual aerobraking experience with the planned aerobraking phase, Magellan was inserted into an elliptical orbit ( $e = 0.392$ ) around the planet Venus on August 10, 1990 and went on to map more than 98% of the surface using a Synthetic Array Radar during the first three **243 day "Cycles"**. High resolution gravity data was collected in a  $\pm 30$  degree band near the equator for a **full 360 degrees of longitude in Cycle 4**. In order to improve the resolution of the gravity data at high latitudes and thus enhance the ability of scientists to interpret the geophysical processes which are creating non-impact features on the surface of Venus, high resolution gravity measurements of the entire Venus globe were required. Global gravity data can be obtained from a nearly circular orbit, however, the only way for the Magellan spacecraft to reach such an orbit was by aerobraking. A small aerodynamic force was applied to the spacecraft **for 730 consecutive orbits** in order to lower the apoapsis of the orbit from 8500 Km to **541 Km**.

Reference 1 described a plan for aerobraking Magellan. This paper will describe how that plan evolved prior to the start of aerobraking, and what modifications had to be made during aerobraking to successfully demonstrate aerobraking as a viable technology.

## Reference:

- 1) D.T. Lyons, W.L. Sjogren, W.T.K. Johnson, D. Schmitt, and A. McDonald, "Aerobraking Magellan", paper # AAS 91-420, AAS/AIAA Astrodynamics Conference, Durango Co., August 19-22, 1991.

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